

Efficient Machine Learning Classification of Latent Fingerprints

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Abstract:

Machine Learning (ML) in forensic science addresses the current and emerging opportunities being utilized to apply modern ML methods to current investigation practices. The proposed research work contributes to advancing these systems through key innovations. Firstly, it uses a combination of publicly available data and synthetically generated datasets to enhance model training. Secondly, it provides an optimized ML algorithm that can work best with a pre-trained feature extraction model, DenseNet-121. The results of the proposed method show that the Support Vector Machine (SVM) classifier, when used in combination with the DenseNet-121 feature vector, achieves an impressive accuracy score of 95% on the NIST SD-302 dataset and provides a highly effective model for latent fingerprint recognition. This work represents a significant advancement in the on-site identification of suspects, contributing to enhanced precision in forensic investigations and law enforcement.

Keywords:

feature vector, latent fingerprints, machine learning, pre-trained model, support vector machine.